

Interactives: Dynamic Learning Environments

by Annette Lamb and Larry Johnson

For over 100 years, hands-on exhibits have been used in museums as integral components of active learning centers. Over the last twenty years, these interactive displays have been combined with computers to create dynamic learning environments. Working collaboratively, educators and museum developers have now produced Web-based interactives that can be used by anyone, anywhere, anytime.

Following are some of these Web-based interactives:

The Children's Museum of Indianapolis (<http://www.childrensmuseum.org/games/>) Online interactives complement physical exhibits.

National Gallery of Art (<http://www.nga.gov/education/classroom/>) Online art activities for children and young adults.

Museum of Modern Art (<http://www.moma.org/learn/activities/>) Interactive art activities for children and young adults.

Public television stations and nonprofit groups such as the following have also been active in developing

interactives:

ThinkPort (<http://www.thinkport.org/Classroom/trips.tp>) creates interactives across the curriculum such as *Lure of the Labyrinth* (<http://labyrinth.thinkport.org/>), a pre-algebra adventure game.

BBC is well-known for their interactives such as *Science Clips* (<http://www.bbc.co.uk/schools/scienceclips/>).

Interactives Defined

Interactives are much more than text, graphics, audio, and video information on a Web page. They provide an engaging environment where learners can organize resources, manipulate information, and even create new content. Students aren't simply consumers of information; they become part of an active, learning experience.

According to Annenberg Media, interactives provide "educators and students with strategies, content, and activities that can enhance and improve students' skills in a variety of curricular areas" (2009, ¶ 1).

The Annenberg interactive, *Elements of a Story* (<http://www.learner.org/interactives/story/>), teaches elementary children how to tell a good story, explore narratives, and write

a story of their own (see Figure 1).

While many interactives run online, others are downloadable and can be played from the computer's hard drive. *WolfQuest* (<http://www.wolfquest.org/>) is an interactive game focusing on the lives of wolves. While students can play the game off-line, they can go online to chat with wolf biologists and share their artwork and stories. The game was found to promote knowledge, and gain an emotional attachment to wolves and an interest in using the online learning resources (Schaller, et al. 2009).

While some interactives are complete instructional packages, others simply provide quality content to explore.

Virtual Field Trips. With limited funding for field trips, consider ways to provide virtual learning visits. Explore *Julia Child's Kitchen*

Figure 1. *Elements of a Story*



(http://americanhistory.si.edu/juliachild/flash_home.asp) at the Smithsonian.

Interactive Maps. Nova's *Last Extinction* (<http://www.pbs.org/wgbh/nova/clovis/prec-flash.html>) provides an interactive map showing where and when the first humans arrived in the Americas.

Multimedia Slide Shows. Through photographs and audio narration, Nova's *Extreme Ice* (<http://www.pbs.org/wgbh/nova/extremeice/melt-flash.html>) tells the story of the world's melting glaciers.

Timelines. From *Sea Monsters: A Prehistoric Adventure* (<http://www.nationalgeographic.com/seamonsters/timeline/>) to *40th Anniversary of Apollo 11* (<http://www.nasm.si.edu/events/apollo11/timeline/>), interactive timelines provide insight and perspective.

Elements of Interactives

A majority of interactives are created using Adobe Flash software. In their book, *AIM Your Project with Flash*, Lamb and Johnson identified three key elements in Flash-based interactives including animation, interaction, and multimedia (2009):

Animation. When teaching many concepts, processes, and procedures, it's helpful to provide instructional materials showing movement. *The Artist's Toolkit* (<http://www.artsconnected.org/toolkit>) provides animated demonstrations of art techniques.

Interaction. Resources such as tutorials, simulations, and educational games use questioning, branching, and individualized feedback to provide a dynamic environment for learning. Interactivity involves two-way communication, opportunities for knowledge construction and decision-making, and chances to take action (Schaller & Allison-Bunnell 2003). *Invention at Play* (<http://www.inventionatplay.org/>)

asks students to invent and create.

Multimedia. The addition of sound, graphics, and video to an interactive allows the educator to address individual learning styles. *Star Fall* (<http://www.starfall.com/>) infuses audio elements essential for young readers, while *Math by Design* (<http://mathbydesign.thinkport.org/>) incorporates short video clips demonstrating real-world applications of math.

Many Web sites combine animation, interaction, and multimedia elements. Reading Is Fundamental's *Reading Planet* (<http://www.rif.org/kids/readingplanet.htm>) contains four categories of interactives: activity lab, game station, book zone, and express yourself.

Interactives in Teaching and Learning

Quality educational interactives are expensive and time-consuming to produce, so national education organizations are working together to make these resources available to teachers and students.

Thinkfinity (<http://thinkfinity.org/>) provides a portal to hundreds of outstanding educational interactives. Simply enter a keyword such as "puppets" and select the resource type: interactive. *Playing with Shadows* (<http://artsedge.kennedy-center.org/shadowpuppets/>) is one of the results (see Figure 2).

David Schaller and others have found that children prefer structured interactives with activities involving role play that allow users to "adopt a persona and interact with other characters" and design projects that "emphasize open-ended inquiry and experimentation, with a personal

creation as the product of the experience" (Schaller, et al. 2007). These types of experiences are found in *Nobel Prize Educational Games* (http://nobelprize.org/educational_games/) where students become scientists and explore significant scientific topics.

Role Playing. Some interactives allow young people to immerse themselves into a virtual world. *Betwixt Folly and Fate* (<http://www.history.org/history/teaching/dayinthelife/>) is a 3-D role-playing game from Colonial Williamsburg that transports students back to 1774.

Investigations. Interactives immerse students in virtual worlds that might be impossible to explore in the "real world." In *BioInteractive Video Labs* (<http://www.hhmi.org/biointeractive/vlabs/index.html>), students conduct lab experiments on topics such as disease.

Gaming Aspects. Web sites such as *Game Goo* (<http://earobics.com/game-goo/>), *FunBrain* (<http://www.funbrain.com/>), and *Scholastic Online Learning* (<http://www2.scholastic.com/browse/learn.jsp>) provide excellent educational games. However, it's important to match these resources with specific learner needs; otherwise, students can easily waste time focusing on the gaming rather than the learning aspects.

Quality Content. Some students find it more interesting to read content in a nonlinear fashion. *Black Holes: Gravity's Relentless Pull* ([Figure 2. *Playing with Shadows*](http://hubble-</p></div><div data-bbox=)



site.org/explore_astronomy/black_holes/) allows students to read at the basic or more advanced level. Subject guides such as *Dynamic Earth* (<http://www.mnh.si.edu/earth/>) incorporate artifacts related to geology, gems, and minerals from the Smithsonian's huge holdings.

Special Needs. Although interactives can enrich the learning environment, they can also inhibit learning for some students. According to Lamb and Johnson, "Flash is not compatible with all assistive technology devices and Web browsers. As a result, it's important to provide alternative text, descriptive captions, or other devices to ensure accessibility of Flash projects" (2006). For instance, Scholastic's *Study Jams!* (<http://teacher.scholastic.com/activities/studyjams/fractions/>) provide three-minute animations introducing topics from fractions to the water cycle. The audio component would be essential for some students, but the lack of descriptive captions would be a barrier for others.

Interactives and 21st-Century Learning

Some interactives are specifically designed to teach 21st-century skills. BBC's *WebWise* (<http://www.bbc.co.uk/webwise/course/>) explains how the Internet works and the need to evaluate the information found on the Web. When teaching young people about

digital production, *MyStudio* (<http://www.mypopstudio.com/>) can be used to take students through the process of selecting, editing, and producing digital content.

Media Awareness Network (<http://www.media-awareness.ca/english/games/index.cfm>) offers educational games related to topics such as online advertising, online privacy, and evaluating Web information. *NetSmartzKids* (<http://www.netsmartzkids.org/>) has cybersafety games and interactive, real life stories.

Interactives are an engaging way to address content area standards. They're also a means to connect 21st-century skills across the curriculum. While using the technology is motivating for students, it's also important to look for topics that will attract the interest of young people. For instance, *Edheads - Design a Cell Phone* (http://edheads.org/activities/eng_cell/) addresses middle school science and technology standards and also helps young people learn about the research process (see Figure 3).

Through the interactive *Into the Book: Teaching Reading Comprehension Strategies* (<http://reading.ecb.org/>), children learn research-based strategies for reading.

Interactives can be used as a tool for generating questions and exploring topics for inquiry. *EcoKids Games* (http://www.ecokids.ca/pub/games_activities/) explore topics related to wild-

life, climate change, energy, water, waste, and more. These games and activities can be used as part of a springboard activity that ends with a list of questions for further investigation.

Some interactives may be useful in a particular stage of the inquiry process. For instance, Exploratorium's *How*

Do We Know What We Know? (<http://www.exploratorium.edu/evidence/>) focuses on the use of evidence during an investigation.

Interactives and the School Librarian

Many teachers are unaware of the wide range of interactives available for teaching and learning. There are many ways to integrate these materials into a virtual library collection.

Virtual Collections. The school library collection can be expanded by integrating the best interactives into the library catalog. Most library automation systems have an option to incorporate Web-based materials. Students can be involved by asking them to rate or review these materials. A good place to start is with *BAM! Body and Mind* (<http://www.bam.gov/>) from the Centers for Disease Control and Prevention.

Jump-Start Partnerships. Interactives can be used as a way to connect with teachers. Suggesting interactives such as *San Francisco Symphony Activities* (<http://www.sfskids.org>), *Dallas Symphony Games* (<http://www.dsokids.com/>), and *New York Philharmonic Kidzone* (<http://www.nyphilkids.org/games/>) to the music teacher may jump-start a new partnership.

Build Connections. From television and movie to book-based resources, school librarians can look for ways to connect library resources with interactives. *Peep and the Big Wide World* (<http://www.peepandthebigwideworld.com/>) is a television program with a Web site full of activities for young children. *Cloudy with a Chance of Meatballs* by Judith Barrett is a popular children's book. The movie Web site games (<http://www.cloudywithachanceofmeatballs.com/>) can be used as a way to get students interested in learning more about the book and the topic of weather. Then students can explore the learning games and activities at Scholastic (<http://www2.scholastic>).

Figure 3. *Edheads - Design a Cell Phone*



com/browse/article.jsp?id=3752259).

Jazz Up Pathfinders. Pathfinders and subject guides can also be enhanced with interactives. The interactive *Shakespeare: Subject to Change* (<http://broadband.ciconline.org/shakespeare/>) is a great way to draw young people into the works of Shakespeare.

An increasing number of content-rich Web sites are being built as interactives. *DNA Interactive* (<http://www.dnai.org/>) incorporates animation, interaction, and multimedia throughout the Web site and also provides teacher resources. *Learn Genetics* (<http://learn.genetics.utah.edu/>) is another example.

Government agencies are building outstanding interactives. *WebRangers* (<http://www.webrangers.us/>) from the National Park Service weaves interactive activities into an exploration of historical and natural sights. *My-Pyramid* (http://www.mypyramid.gov/kids/kids_game.html) from the U. S. Department of Agriculture helps young people learn about nutrition.

Universities and research institutes also sponsor development of interactives. *Food Detectives* (<http://www.fooddetectives.com/>) is one of a number of educational games developed by the New Mexico State University (<http://mediaproductions.nmsu.edu/learning-games.html>).

Interactives can be found by adding the word “interactive” to a subject search. Also, by a search within Web sites, school librarians can sometimes find a directory of interactives such as the *National Geographic Interactives* (<http://ngm.nationalgeographic.com/more/interactives>).

Many more examples of Flash-based projects across subject areas and grade levels can be found at *AIM Your Projects with Flash* (<http://eduscapes.com/flash/explore.htm>).

Consider Collections. While some organizations develop individual interactives, some groups are building collections of quality interactives. Some of these collections include the following:

Annenberg Media. <http://www.learner.org/interactives/>

Field Museum. http://www.fieldmuseum.org/exhibits/online_interactive.htm
Nova. <http://www.pbs.org/wgbh/nova/hotscience/>
Smithsonian's History Explorer. <http://historyexplorer.americanhistory.si.edu/interactives/>

Service Options. Although many Web sites are free, an increasing number of resources, such as *BrainPop* (<http://brainpop.com/>), are available as subscriptions. PBSKids has recently introduced a subscription-based project for young children called *PBSKids Play* (<http://pbskidsplay.org/>). Some Web sites, such as *Edheads* (<http://edheads.org/>), rely on donations.

Conclusion

While museums such as the American Museum of Natural History continue to be at the forefront of interactives for young people with programs such as *Ology* (<http://www.amnh.org/ology/>), a growing number of other groups are now producing these engaging learning materials (see Figure 4).

When Web 2.0 applications are combined with the quality content of interactives, powerful products can be created. *Smarthistory* (<http://smarthistory.org/>) is a multimedia Web book about art and art history that combines animation, interaction, and multimedia elements with the social and collaborative features of YouTube, Flickr, and Twitter.

Interactives are an effective, efficient,

and appealing way to engage 21st-century learners.

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Figure 4. *Ology*



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